

(f) *Pull at joints and terminals.* Each flexible cord and cable must be connected to a device or fitting by a knot, tape, or special fitting so that tension is not transmitted to joints or terminal screws.

[CGD 74-125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94-108, 61 FR 28281, June 4, 1996; USCG-2003-16630, 73 FR 65198, Oct. 31, 2008]

§ 111.60-17 Connections and terminations.

(a) In general, connections and terminations to all conductors must retain the original electrical, mechanical, flame-retarding, and, where necessary, fire-resisting properties of the cable. All connecting devices must be suitable for copper stranded conductors.

(b) If twist-on type of connectors are used, the connections must be made within an enclosure and the insulated cap of the connector must be secured to prevent loosening due to vibration.

(c) Twist-on type of connectors may not be used for making joints in cables, facilitating a conductor splice, or extending the length of a circuit.

[CGD 94-108, 61 FR 28281, June 4, 1996]

§ 111.60-19 Cable splices.

(a) A cable must not be spliced in a hazardous location, except in intrinsically safe systems.

(b) Each cable splice must be made in accordance with section 25.11 of IEEE 45-2002 (incorporated by reference; see 46 CFR 110.10-1).

[CGD 94-108, 61 FR 28281, June 4, 1996, as amended by USCG-2003-16630, 73 FR 65198, Oct. 31, 2008]

§ 111.60-21 Cable insulation tests.

All cable for electric power and lighting and associated equipment must be checked for proper insulation resistance to ground and between conductors. The insulation resistance must not be less than that in section 34.2.1 of IEEE 45-2002 (incorporated by reference; see 46 CFR 110.10-1).

[USCG-2003-16630, 73 FR 65199, Oct. 31, 2008]

§ 111.60-23 Metal-clad (Type MC) cable.

(a) Metal-clad (Type MC) cable permitted on board a vessel must be continuous corrugated metal-clad cable.

(b) The cable must have a corrugated gas-tight, vapor-tight, and watertight sheath of aluminum or other suitable metal that is close-fitting around the conductors and fillers and that has an overall jacket of an impervious PVC or thermoset material.

(c) The cable is not allowed in areas or applications exposed to high vibration, festooning, repeated flexing, excessive movement, or twisting, such as in engine rooms, on elevators, or in the area of drill floors, draw works, shakers, and mud pits.

(d) The cable must be installed in accordance with Article 326 of NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10-1). The ampacity values found in table 25 of IEEE 45-2002 (incorporated by reference; see 46 CFR 110.10-1) may not be used.

(e) The side wall pressure on the cable must not exceed 1,000 pounds per foot of radius.

(f) Equipment grounding conductors in the cable must be sized in accordance with Section 250.122 of NFPA NEC 2002. System grounding conductors must be of a cross-sectional area not less than that of the normal current carrying conductors of the cable. The metal sheath must be grounded but must not be used as a required grounding conductor.

(g) On an offshore floating drilling and production facility, the cable may be used as interconnect cable between production modules and between fixed distribution panels within the production modules, except that interconnection between production and temporary drilling packages is prohibited. Also, the cable may be used within columns, provided that the columns are not subject to the conditions described in paragraph (c) of this section.

(h) When the cable is used within a hazardous (classified) location, terminations or fittings must be listed, and must be appropriate, for the particular

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Type MC cable used and for the environment in which they are installed.

[CGD 94-108, 62 FR 23908, May 1, 1997, as amended by USCG-2003-16630, 73 FR 65199, Oct. 31, 2008]

Subpart 111.70—Motor Circuits, Controllers, and Protection

§ 111.70-1 General.

(a) Each motor circuit, controller, and protection must meet the requirements of ABS Steel Vessel Rules, sections 4-8-2/9.17, 4-8-3/5.7.3, 4-8-4/9.5, and 4-8-3/5; ABS MODU Rules, Part 4, Chapter 3, sections 4/7.11 and 4/7.17; or IEC 60092-301 (all three standards incorporated by reference; see 46 CFR 110.10-1), as appropriate, except for the following circuits:

(1) Each steering gear motor circuit and protection must meet part 58, subpart 58.25, of this chapter.

(2) Each propulsion motor circuit and protection must meet subpart 111.35 of this part.

(b) In ungrounded three-phase alternating current systems, only two motor-running protective devices (overload coil or heater type relay within the motor and controller) need be used in any two ungrounded conductors, except when a wye-delta or a delta-wye transformer is used.

(c) The motor disconnecting means must be an externally operable switch or circuit breaker.

[CGD 74-125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94-108, 61 FR 28281, June 4, 1996; 62 FR 23909, May 1, 1997; USCG-2003-16630, 73 FR 65199, Oct. 31, 2008; USCG-2013-0671, 78 FR 60153, Sept. 30, 2013]

§ 111.70-3 Motor controllers and motor-control centers.

(a) *General.* The enclosure for each motor controller or motor-control center must meet either NEMA ICS 2 and NEMA ICS 2.3, or Table 5 of IEC 60092-201 (all three standards incorporated by reference; see 46 CFR 110.10-1), as appropriate, for the location where it is installed. In addition, each such enclosure in a hazardous location must meet subpart 111.105 of this part. NEMA ICS 2.4 (incorporated by reference; see 46 CFR 110.10-1) provides guidance on the differences between devices meeting

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NEMA and those meeting IEC for motor service.

(b) *Low-voltage release.* Each motor controller for a fire pump, elevator, steering gear, or auxiliary that is vital to the vessel's propulsion system, except a motor controller for a vital propulsion auxiliary which can be restarted from a central control station, must have low-voltage release if automatic restart after a voltage failure or its resumption to operation is not hazardous. If automatic restart is hazardous, the motor controller must have low-voltage protection. Motor controllers for other motors must not have low-voltage release unless the starting current and the short-time sustained current of the additional low-voltage release load is within the capacity of one ship's service generator. Automatic sequential starting of low-voltage release controllers is acceptable to meet this paragraph.

(c) *Low-voltage protection.* Each motor controller must have low-voltage protection, except for the following motor controllers:

(1) A motor controller that has low-voltage release under paragraph (b) of this section.

(2) A motor controller for a motor of less than 2 horsepower (1.5 kW).

(d) *Identification of controllers.* (1) Each motor controller and motor control center must be marked externally with the following information:

(i) Manufacturer's name or identification.

(ii) Voltage.

(iii) Number of phases.

(iv) Current.

(v) kW (Horsepower).

(vi) Identification of motor being controlled.

(vii) Current rating of trip setting.

(2) Each controller must be provided with heat durable and permanent elementary wiring/schematic diagrams of the controller located on the door interior.

[CGD 94-108, 61 FR 28281, June 4, 1996; 61 FR 33045, June 26, 1996, as amended by USCG-2003-16630, 73 FR 65199, Oct. 31, 2008; USCG-2013-0671, 78 FR 60153, Sept. 30, 2013]

§ 111.70-5 Heater circuits.

(a) If an enclosure for a motor, master switch, or other equipment has an